United States
Environmental Protection
Agency

Region 10
Washington Operations Office
c/o Washington Department of Ecology, PV-11
Olympia WA 98504

Washington

GECSF
57.1
4/30/92

EPA

April 30, 1992

Reply To
Attn Of: WOO

MEMORANDUM

SUBJECT: Removal Assessment at NPL Sites - No Additional Action Recommended for General Electric Company - Spokane, Washington

FROM: Robert E. Kievit
Hazardous Waste Coordinator
Washington Operations Office

TO: Files

The General Electric site has been reviewed and it is my judgement that this site does not represent an immediate risk to public health and/or the environment, and that no further action by the removal program is recommended.

This judgement is based on the following:

General Electric completed a removal action in the summer of 1990 pursuant to an Agreed Order with the State. The action consisted of demolition and removal of the service shop, several storage tanks, and other underground structures. Additional activities subsequent to the removal action, consisting of preparing test cells for treatability studies resulted in the removal of all surface contamination from the site. The RI/FS is scheduled to be completed by mid-1992 and will be used to determine the appropriate remedial action to address subsurface and groundwater contamination.

11-20-91	Robert E Kievit	4-30-92
Date Inspected	Regional Project Manager	Date

United States Environmental Protection Agency

Region 10
1200 Sixth Avenue
Seattle WA 98101

Alaska
Idaho
Oregon
Washington

EPA

SEP 1 9 1990

RELPY TO
ATTN OF: HW-093

SUBJECT: Removal Assessment at NPL Sites - No Additional Action Recommended

FROM: John Sainsbury

TO: Files

Re: General Electric - Spokane

The above referenced site has been reviewed and it is my judgement that this site does not represent an immediate risk to public health and/or the environment, and that no further action by the removal program is recommended.

This judgement is based on the following:
The emergency conditions at the site have already been addressed thru actions taken or pending by the State lead remedial program

9-19-90
Date Inspected

On-Scene Coordinator/
Regional Project Manager

9/19/90
Date

TECHNICAL ASSISTANCE TEAM
SITE ASSESSMENT
FINAL REPORT FOR:

G. E. APPARATUS SERVICE SHOP
SPOKANE, WASHINGTON

TDD T10-8810-015

REPORT PREPARED BY: ECOLOGY AND ENVIRONMENT, INC.
PROJECT MANAGER: MICHAEL G. BRAY
DATE: APRIL 1989

SUBMITTED TO CARL G. KITZ, DEPUTY PROJECT OFFICER
SUPERFUND RESPONSE AND INVESTIGATIONS SECTION
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
SEATTLE, WASHINGTON

ecology and environment, inc.
101 YESLER WAY, SEATTLE, WASHINGTON, 98104, TEL. 206/624-9537
International Specialists in the Environment
recycled paper

ABSTRACT

General Electric Company Apparatus Service Shop is located in a commercial and industrial area on the east side of Spokane, Washington. Two Field Investigations and a Remedial Investigation have been conducted at the site. During these investigations, surface and subsurface soil samples, as well as groundwater samples, have been collected. Results of these samples indicate elevated levels of polychlorinated biphenyl compounds on site and on adjacent property. Included in this report are suggested soil treatment technologies.

ecology and environment, inc.
101 YESLER WAY, SEATTLE, WASHINGTON, 98104, TEL. 206/624-9537
International Specialists in the Environment

April 7, 1989

Carl G. Kitz
Environmental Protection Agency
1200 Sixth Avenue, HW-113
Seattle, WA 98101

Ref: TDD T10-8810-015

Dear Carl:

Enclosed please find the site assessment report and the Potential Hazardous Waste Site Identification form for the G. E. Apparatus Service Shop, situated in Spokane, Washington.

Sincerely,

Richard W. Fullner

Richard W. Fullner
TAT Leader

MGB/thl

Enclosure

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SITE ASSESSMENT REPORT FOR
G. E. APPARATUS SERVICE SHOP
SPOKANE, WASHINGTON
T10-8810-015

Site Name/Address:

G. E. Apparatus Service Shop
East 4323 Mission Avenue
Spokane, Washington 99212-1313

Investigation Participants:

Michael Bray, TAT-Chemist
Ecology and Environment, Inc., Seattle, Washington (206) 624-9537

Persons Contacted:

Brad Ewy
Washington State Department of Ecology, Olympia, Washington
(206) 438-3072

Dan Tangerone
United States Environmental Protection Agency, Seattle, Washington
(206) 442-1630

Barry York
General Electric Company, Schenectady, New York (518) 385-0545

Date of Site Assessment:

November 30, 1988

1.0 INTRODUCTION

The General Electric Apparatus Service Shop (Service Shop), a former industrial and utility equipment repair facility, accepted and stored transformers and polychlorinated biphenyl (PCB) - contaminated oil on site until 1980. Analytical results from previous investigations indicate elevated levels of PCBs in the soil and the groundwater on site.

Based on the PCB levels detected on site, the Environmental Protection Agency (EPA) Region X Superfund Response and Investigations Section tasked the Ecology and Environment, Inc. (E & E), Region 10 Technical Assistance Team (TAT) to conduct a site assessment at the Service Shop. The purpose of the assessment was to evaluate the need for removal action, based on a file review and an on-site inspection, and to determine potential removal options at the site.

2.0 OWNER/OPERATOR

The Service Shop (Figure 1) was owned and operated by the General Electric Company (G. E.), Schenectady, New York, from 1961 to 1980. From 1980 until 1984, Brondt's Metal Magic, Inc., owned the property and manufactured wood stoves and fireplace inserts. Bankruptcy proceedings by Brondt's Metal Magic in late 1984 returned ownership of the property to the G. E. G. E. is the current owner of the former apparatus service shop (WDOE, 1986).

Property to the south and west of the site, where soil sample results indicate PCB contamination, is owned by the Washington Water Power Company. Property bordering the site to the north, which was leased by G. E. from 1975 to 1980 and used for site operations (the north warehouse), is owned by Mr. Marvin Riley (see Figure 2) (Golder 1988).

3.0 LOCATION

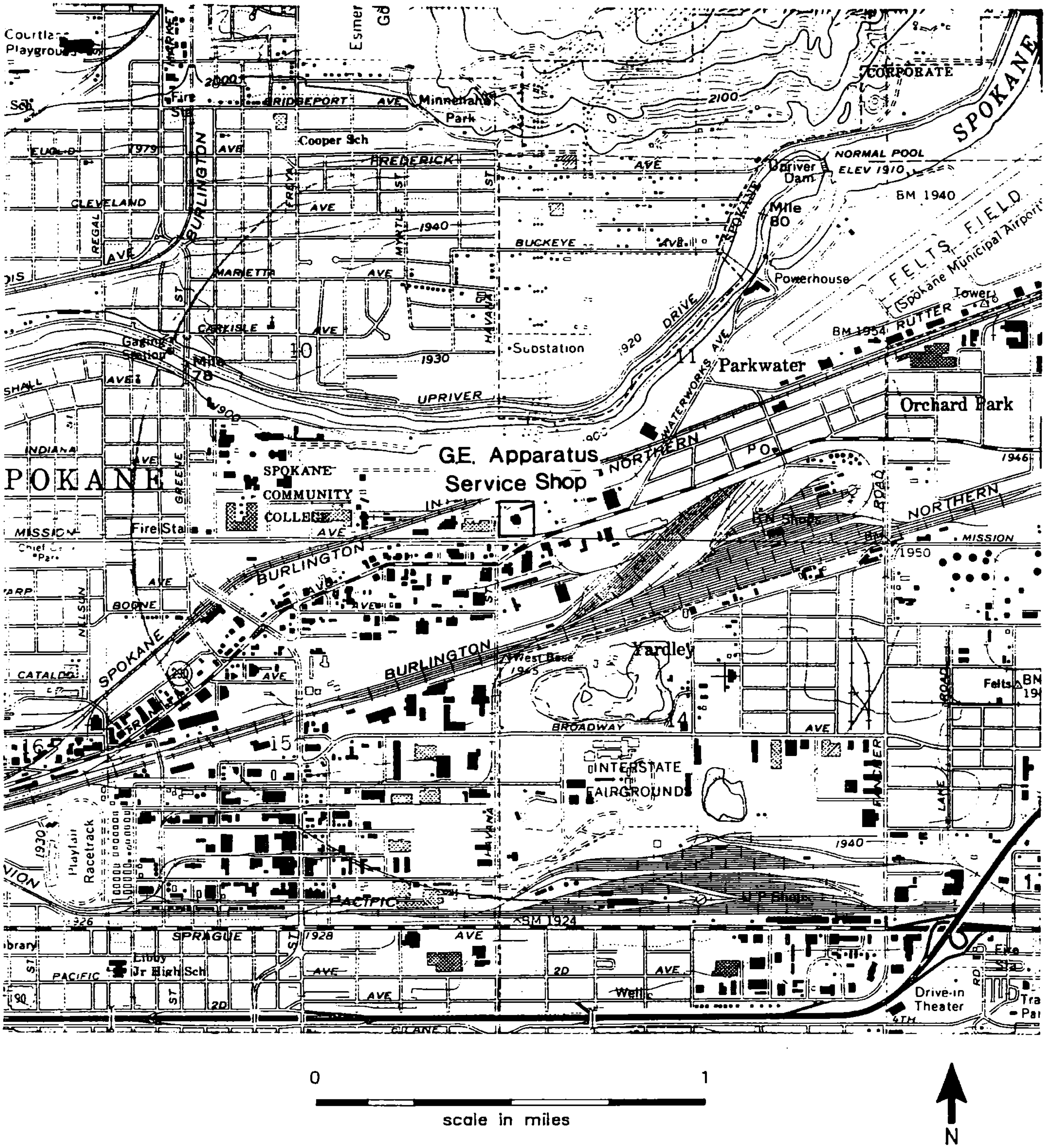
The Service Shop is located at East 4323 Mission Avenue, Spokane, in the SW 1/4, SW 1/4, sec. 14, T. 25 N., R. 43 E., Spokane County, Washington (see Figure 1). The facility is located on the east side of Spokane in a commercial and industrial area (USGS 1973).

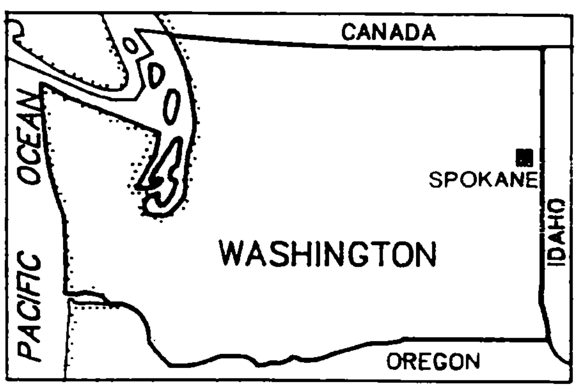
4.0 DESCRIPTION OF SITE AND SURROUNDING AREA

The G. E.-owned portion of the site is situated on approximately one acre. Located on site is a building complex of approximately 11,000 square feet (WDOE 1986) (see Figure 3). The service shop complex consists of:

- 7520 square-foot concrete block main structure (original service shop area);
- 800 square-foot metal building attached to the north side of the main building (north addition);
- 1920 square-foot metal building attached to west side of main building (west addition); and
- 608 square-foot concrete block shed situated west of the 1920-square-foot metal building (west addition)

Two dry wells are located within the service shop building complex. The west dry well is located in the west addition of the building complex (Figure 3). The dry well is four feet in diameter, eight and one-half feet deep and is covered by a two-foot in diameter grate. The walls of the dry well are made of open-work brick and the bottom is unlined. An overflow drain line pipe extends approximately 120 feet west-northwest of the dry well and discharges into a steel drum filled with gravel (Bechtel 1986a, 1987).

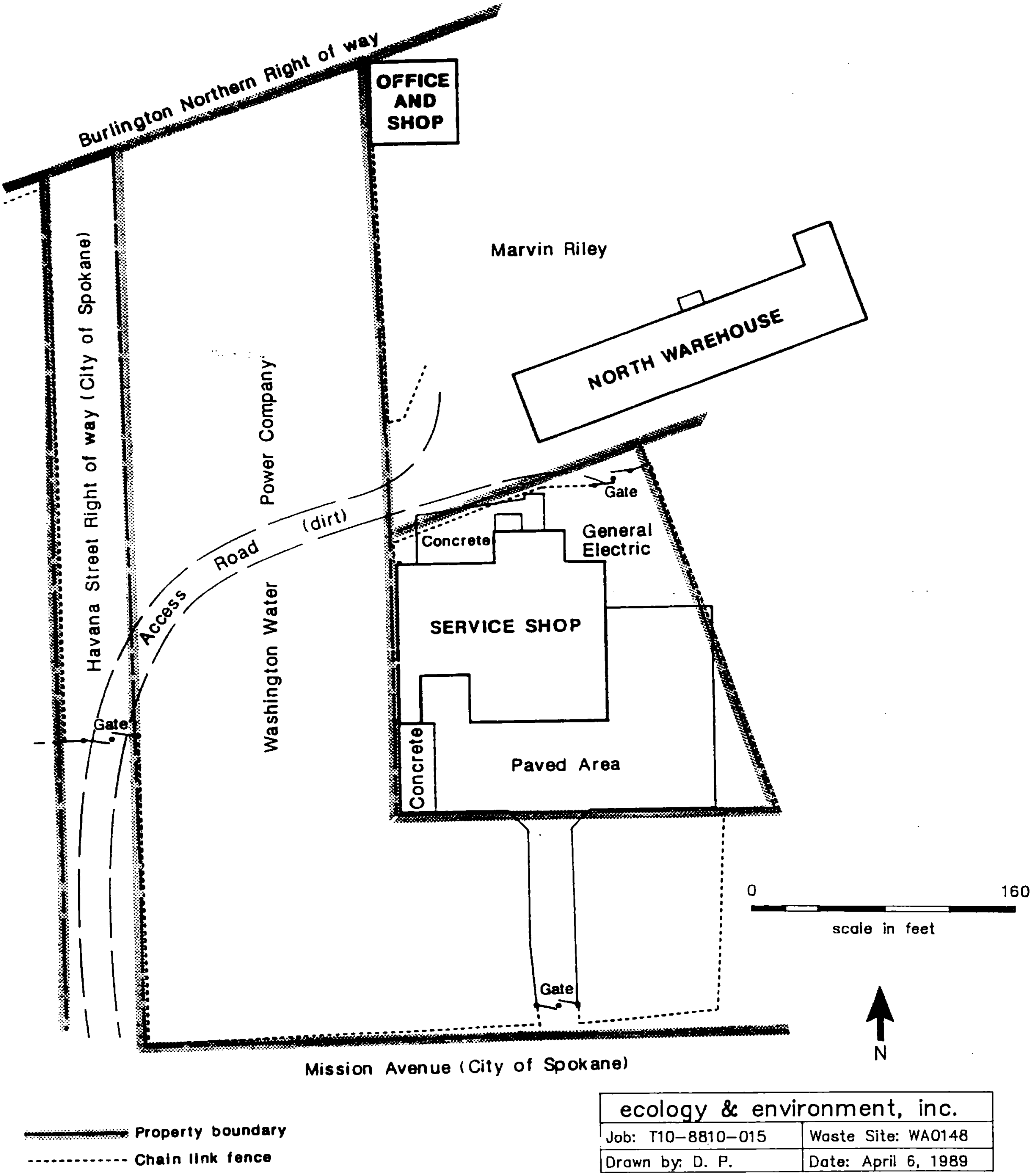




Source: USGS 1973

ecology & environment, inc.	
Job: T10–8810–015	Waste Site: WA0148
Drawn by: D. P.	Date: April 6, 1989

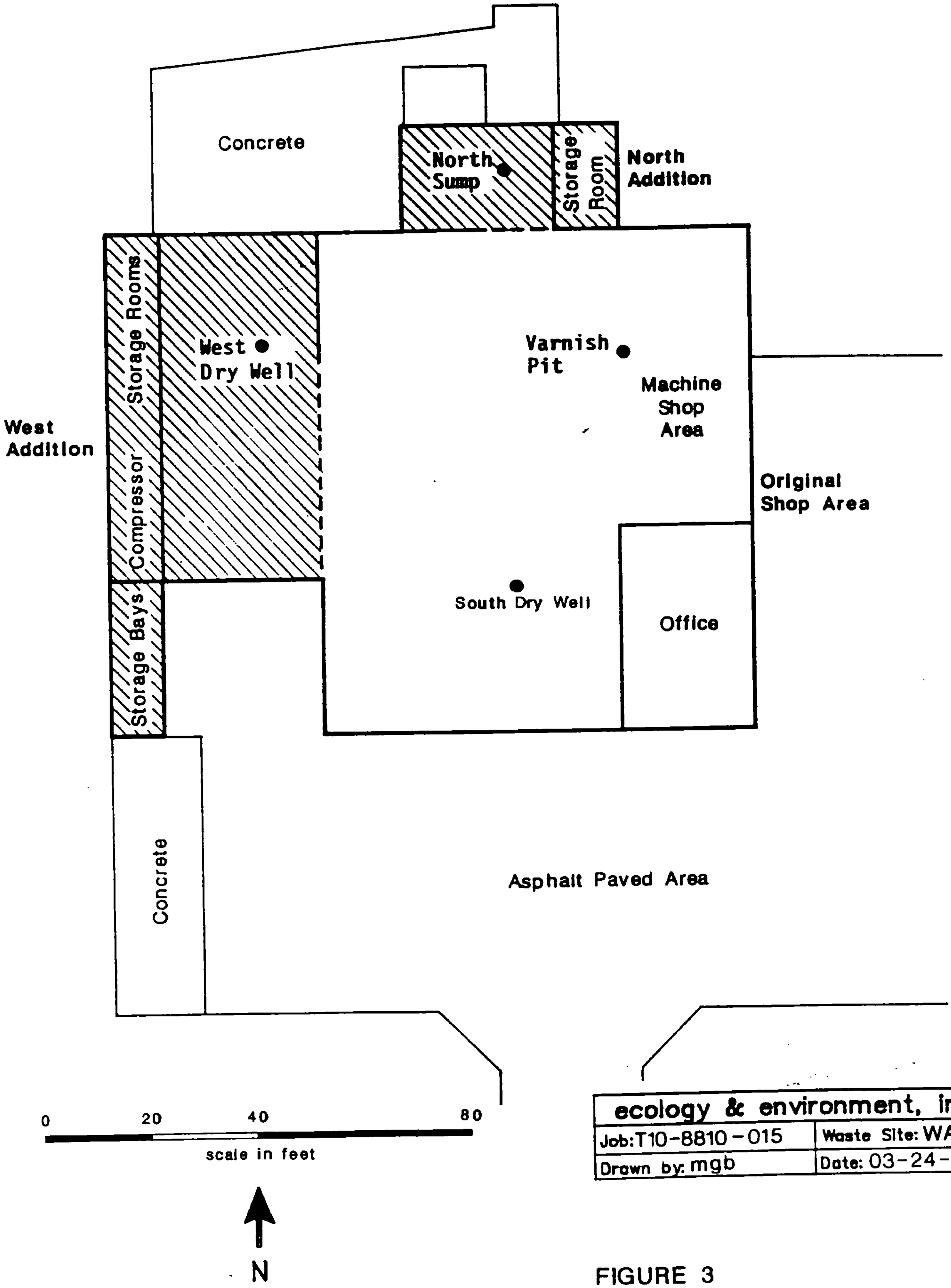
FIGURE 1
LOCATION MAP
G.E. APPARATUS SERVICE SHOP
Spokane, WA



ecology & environment, inc.	
Job: T10-8810-015	Waste Site: WA0148
Drawn by: D. P.	Date: April 6, 1989

Source: Golder Associates 1988

FIGURE 2
SITE OWNERSHIP AND ACCESS MAP
G.E. APPARATUS SERVICE SHOP
Spokane, WA



ecology & environment, inc.	
Job:T10-8810-015	Waste Site: WA-0148
Drawn by: mgb	Date: 03-24-89

Source: Golder Associates 1988

FIGURE 3
SERVICE SHOP LAYOUT
G.E.™ APPARATUS SERVICE SHOP
Spokane, WA

The south dry well is located in the southern portion of the building complex in a former machine shop area. The dry well was reportedly excavated to allow room for repair work on large electrical equipment. This unlined dry well is two feet in diameter and three feet deep (Bechtel 1986a).

A pit and five sumps are also situated within the service shop complex area (Bechtel 1986a; Golder 1988). The locations of the varnish pit and the north sump are depicted in Figure 3.

The north warehouse is situated on property bordering the site to the north. Four sumps (Bechtel 1986a; Golder 1988) located in the north warehouse area.

The Service Shop is located on the east side of Spokane. There are 26 schools within three miles of the site, seven of the schools are within two miles. The Interstate Fairgrounds, a municipal airport and Spokane Community College are located within one mile of the site (USGS 1973).

5.0 OVERVIEW OF SITE OPERATIONS

The G. E. owned and operated the site from 1961 to 1980. During this time, G. E. operated this facility as the Spokane Apparatus Service Shop. The Service Shop was used for the repair of industrial and utility equipment, including transformers. Machine shop activities, as well as steam cleaning of equipment, also occurred during the site operations. Steam-cleaning runoff was collected in the west dry well and the north sump. Until late 1976, PCB fluids were stored and used on site. Between 1976 and 1980, only non-PCB (less than 50 ppm) transformers were serviced at this facility (WDOE 1986). Transformers were stored in areas south and west of the original shop area. The west addition of the facility was covered in 1962 and enclosed in 1967. The north addition was constructed in 1971 (Bechtel 1986a, 1987; Golder 1988).

Sumps situated within the Service Shop complex were used to collect storm runoff, wastewater, and/or liquid overflow from other sumps. During site operations, the south dry well was used to collect water that dripped off trucks and to collect floor sweepings. The varnish pit contained a steel varnish tank (Bechtel 1986a, 1987; Golder 1988).

The north warehouse and surrounding property was leased by G. E. from Mr. Marvin Riley from 1975 to 1980. The north warehouse was used by G. E. for the storage of transformer oils, the repair of equipment (including transformers), and the manufacture of motor coils. During the G. E. operations, steam-cleaning runoff was collected in three sumps in the north warehouse area. The forth sump, situated north of the warehouse, was used to collect effluent from restrooms and process water from a coil shop area (Golder 1988).

6.0 TOPOGRAPHY AND DRAINAGE

The general terrain in the vicinity of the site is relatively flat with a 1-2% slope to the north-northwest. The Spokane River is located approximately 1/4 mile to the north (USGS 1973).

7.0 GEOLOGY/HYDROGEOLOGY

The geologic and hydrogeologic conditions have been described in detail by previous remedial and field investigation reports from which the following information has been obtained.

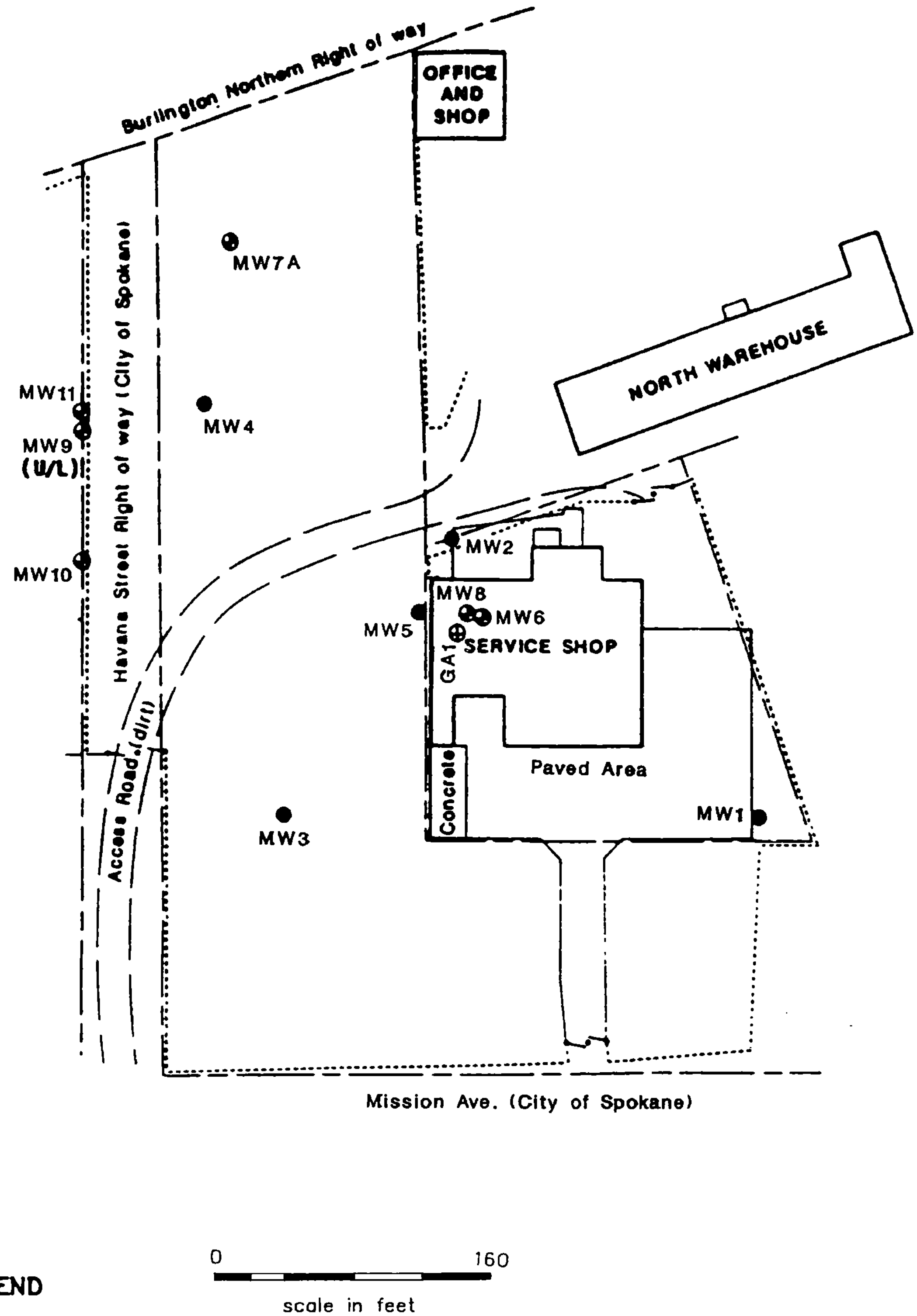
Sediments underlying the site are composed of late Pleistocene age glacial fluvial, lacustrine and Missoula Flood deposits typical of the Spokane Valley. Driller logs from the site show that these sediments consist predominately of poorly sorted, poorly bedded, unconsolidated sands and gravels beneath the G. E. facility (Bechtel 1986a, 1987; Golder 1988).

The saturated sands and gravels underlying the site are part of the Spokane Valley-Rathdrum Prairie Aquifer, an EPA-designated sole source aquifer. Hydrogeologic conditions in the vicinity of the site have been defined by 11 monitoring wells (Figure 4). Beneath the site, depth to water table fluctuates seasonally, but averages approximately 65 feet below ground surface (b.g.s.). Hydraulic conductivity of the aquifer in the vicinity of the site has been estimated to be between 0.02 and 0.04 ft/sec. Assuming an average saturated thickness of 300 feet, the transmissivity of the aquifer was calculated to be between 6 and 12 ft^2/sec at the site location. Groundwater velocity on site was estimated at 20 to 30 ft/day (Golder 1988).

Towards the southern portion of the site, groundwater flows to the west, while at the northern portion of the site, groundwater flows in a more northerly direction. The horizontal flow gradient steepens from about 0.0007 ft/ft near the center of the site, to 0.0019 ft/ft towards the western site boundary. Measured vertical gradients are greater in magnitude than corresponding horizontal gradients. These data indicate a mounded groundwater table beneath the site, apparently representing a small, localized recharge zone (Golder 1988).

8.0 WATER USE

Groundwater within three miles of the site is used for industrial, domestic, and public water supplies. The Spokane River is located approximately 1/4 mile to the north of the site. The Spokane River is used for recreation, hydroelectric power generation, and irrigation (WDOE 1986).



LEGEND

- Phase III monitoring well
- Phase III exploratory boring
- Existing monitoring well
- Property boundary
- Chain link fence

Source: Golder Associates 1988

ecology & environment, inc.	
Job: T10-8810-015	Waste Site: WA0148
Drawn by: D. P.	Date: April 6, 1989

FIGURE 4
LOCATION OF EXPLORATORY BORINGS AND MONITORING WELLS
G.E. APPARATUS SERVICE SHOP
Spokane, WA

9.0 PREVIOUS INVESTIGATIONS

9.1 EPA Inspection

In April 1976, Dan Tangerone of the EPA conducted a site inspection at the the service shop. Results of samples collected during this site inspection showed PCB concentrations in the soil from 21 to 11,200 mg/kg (USEPA 1989).

9.2 Washington State Department of Ecology Inspection

A site inspection was performed by Michael Spencer and Ned Therien of the Washington State Department of Ecology on October 15, 1985. A total of seven samples were collected during this visit. Four near-surface (1 to 6 inches b.g.s.) soil samples and two sediment samples were collected from areas adjacent to the Service Shop, and from dry wells within the service shop, respectively. A background soil sample was also collected during this investigation. All seven samples were analyzed for PCBs and EP toxicity metals (WDOE 1986).

PCBs were found in all on-site soil samples at concentrations greater than 10 mg/kg. Results of the background soil sample were found to contain PCB at 68 ug/kg (.068 mg/kg). Results of a sample collected at the southwest corner of the building complex contained 5,538 mg/kg PCBs, and the results of a sediment sample collected from the west dry well contained 6,880 mg/kg PCBs (WDOE 1986).

EP toxicity metal results found only the extract of the west dry well sediment sample to contain metal levels above the EP toxicity characteristic (WDOE 1986).

9.3 General Electric Company Investigations

G. E., contracted Bechtel National, Inc., to perform field investigations at the former Service Shop and the north warehouse in 1986. Golder Associates was contracted to perform a remedial investigation at the site from July 1987 to January 1988 (Bechtel 1986a, 1986b, 1987; Golder 1988).

During these investigations soil samples were collected to characterize surface and subsurface soil contamination. Eleven monitoring wells were installed and sampled to characterize groundwater contamination on site. A variety of samples were also collected to characterize on-site building, dry well, and sump contamination (Bechtel 1986a, 1986b, 1987; Golder 1988).

Analytical results of samples collected from on-site sumps indicate low concentrations of the contaminants analyzed for. Based on these results, the sumps are not considered a primary contaminant source to on-site soil and groundwater (Bechtel 1986a, 1986b, 1987).

9.3.1 Soil Contamination

Analytical results of surface and near-surface soil samples indicate the PCB soil contamination on site is primarily located along the west side of the former Service Shop (see Figure 5). Sample results also show the PCB contamination extends along the northern portion of the building and along the southern edge of the paved/concreted area on the south side of the building. The sample results also show the area located south and west of a concrete pad (SW of the Service Shop) contained the highest concentration of PCBs in the soil (up to 26,682 mg/kg). This area was used as a transformer storage area.

Subsurface soil sample results show PCB levels decrease to below 10 mg/kg at 3 feet b.g.s.; except for areas associated with the west dry well drain lines (37.6 to 1392 mg/kg) and one area located south of the paved area (21.9 mg/kg)(Bechtel 1986a, 1987; Golder 1988).

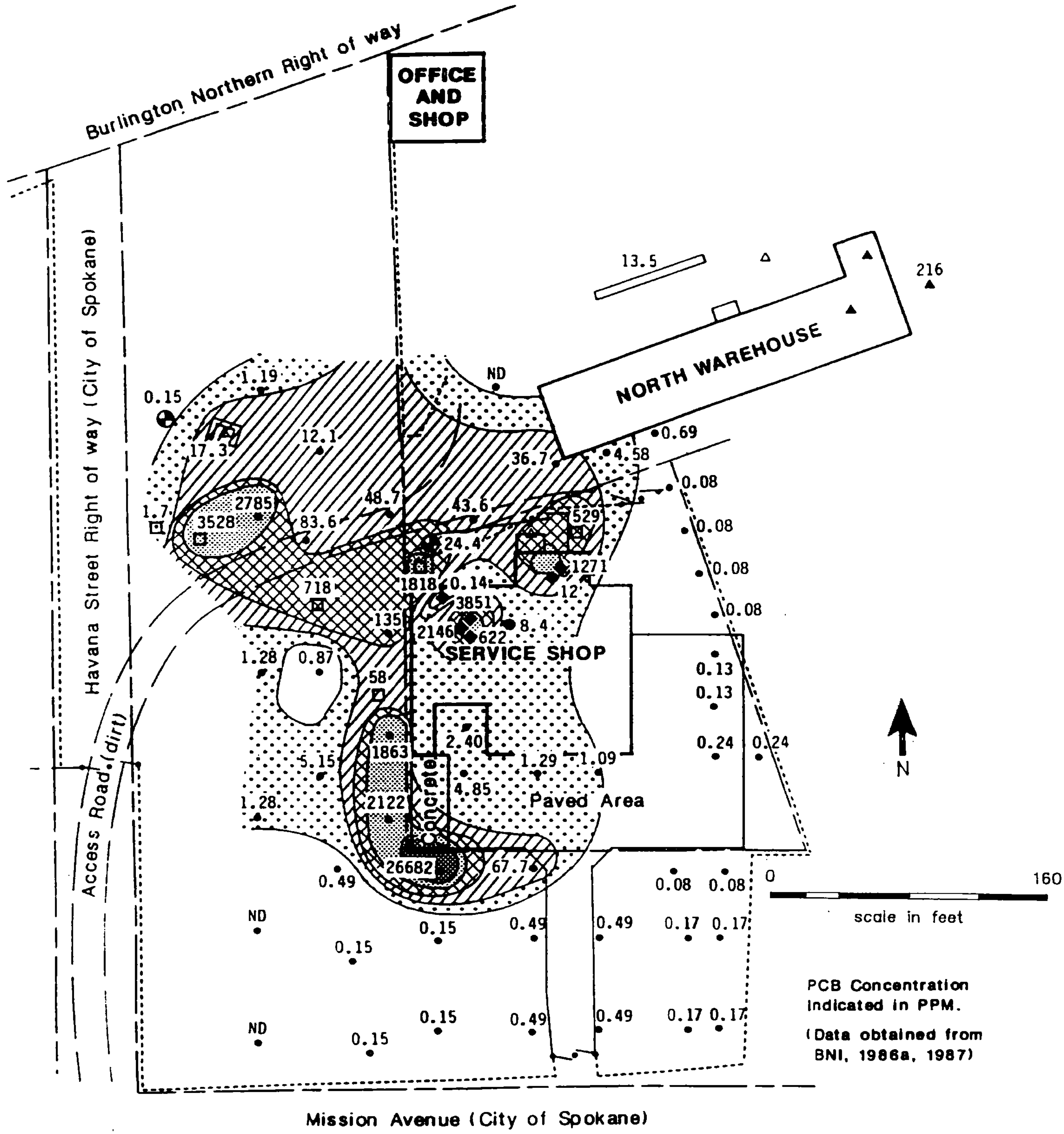
Soil sample results show lead levels up to 860 mg/kg at the southwest corner of the north warehouse. Results of a four-point composite surface soil sample, collected in the vicinity of the west dry well drain line, contained lead at 146 mg/kg (Bechtel 1986a, 1986b, 1987; Golder 1988). Lead levels may be higher than 146 mg/kg at one or more of the four drain line soil collection points.

9.3.2 West Dry Well Contamination

PCBs have been detected in soil samples collected directly from the west dry well. Borehole soil samples collected directly in the west dry well have shown PCBs at concentrations up to 21,400 mg/kg at 21 feet b.g.s. (Bechtel 1986a). Analytical results of soil samples collected from an adjacent borehole (GA-1) and from monitoring wells MW-6 and MW-8 have found PCBs at concentrations between 1000 to 10,000 mg/kg at depths down to 28 feet b.g.s.; 100 to 1,000 mg/kg at depths down to 60 feet b.g.s.; between 10 to 100 mg/kg at depths down to 84 feet b.g.s.; and between 1 to 10 mg/kg down to 103.5 feet b.g.s. (see Figure 6)(Golder 1988).

The lateral extent of PCB contamination in the vicinity of the west dry well appears to be limited to soils below the concrete floor adjacent to the dry well. Analytical results of soil samples collected from a deviated borehole adjacent to the west dry well did not indicate PCB levels above the laboratory detection limit (at a radial distance greater than 15 feet from the center of the dry well). Analytical results of soil samples collected from a vertical borehole drilled ten feet west-northwest of the west dry well did not demonstrate PCB concentrations above 10 mg/kg below a depth of 20 feet b.g.s. (Golder 1988).

The vertical and horizontal extent of volatile organic soil contamination in the west dry well area is difficult to assess from previous investigations due to method blanks contamination and the use of an air rotary drill rig for soil borings. Tetrachloroethylene (detected to a depth of 118.5 feet b.g.s.) and xylenes (detected to a



PCB Concentration (ppm)

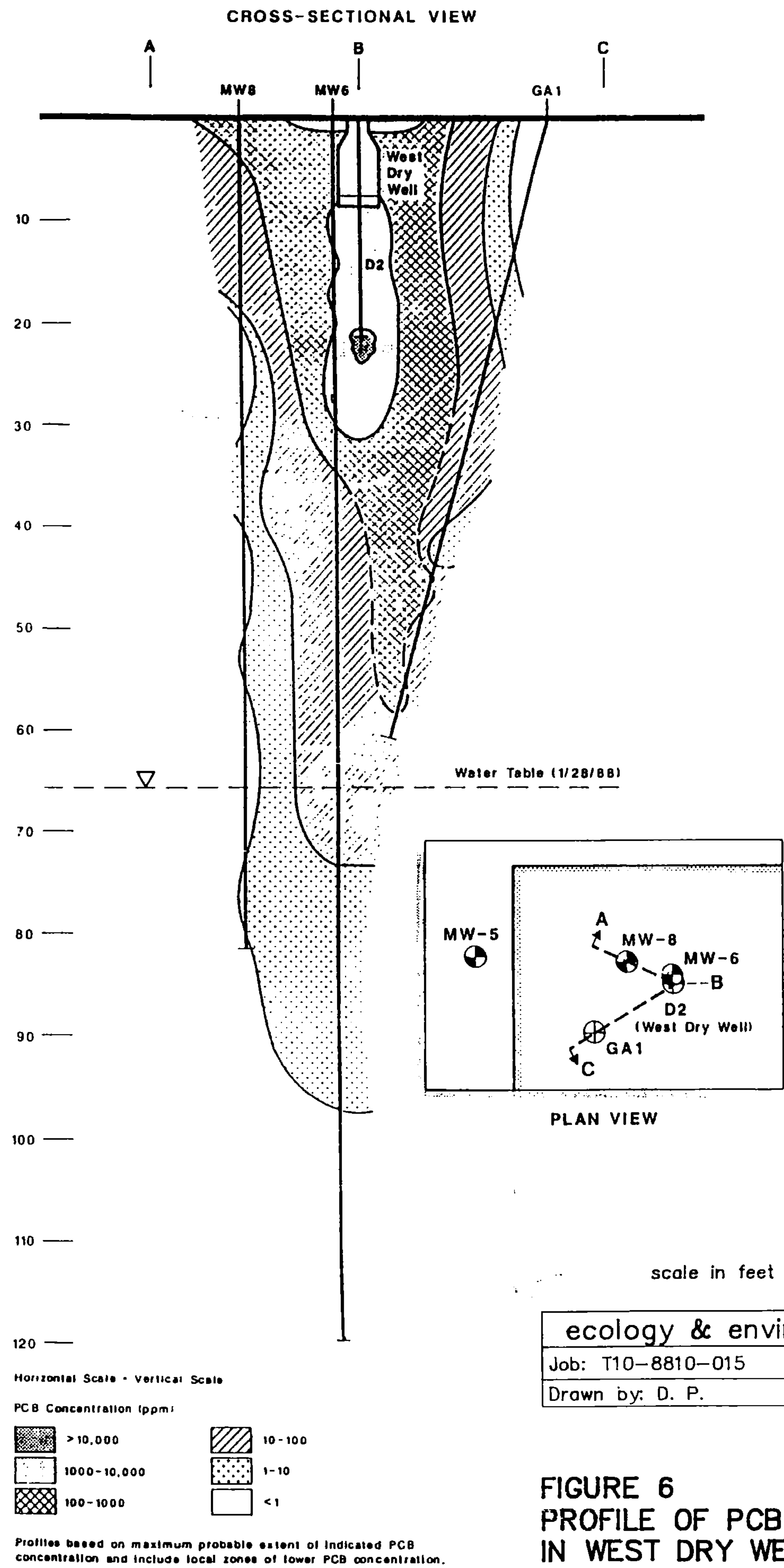
- > 10,000
- 1000-10,000
- 100-1000
- 10-100
- 1-10
- < 1

- Pit sample location
- Sump sample location
- Drill hole location
- Monitoring well location
- Phase I sample location
- Property boundary
- Chain link fence

ecology & environment, inc.	
Job: T10-8810-015	Waste Site: WA0148
Drawn by: D. P.	Date: April 6, 1989

FIGURE 5
DISTRIBUTION OF MAXIMUM PCB CONC. IN NEAR SURFACE SOILS, PHASE 1 & 2 RESULTS
G.E. APPARATUS SERVICE SHOP
Spokane, WA

Source: Golder Associates 1988



scale in feet

ecology & environment, inc.	
Job: T10–8810–015	Waste Site: WA0148
Drawn by: D. P.	Date: April 6, 1989

FIGURE 6
PROFILE OF PCB CONCENTRATION IN WEST DRY WELL AREA
G.E. APPARATUS SERVICE SHOP
Spokane, WA

Source: Golder Associates 1988

depth of 74 feet b.g.s.) were found in many of the soil samples collected (Golder 1988). Benzene was also detected in two of the subsurface soil samples collected at depths of 18.5 and 28.0 feet b.g.s. (Golder 1988). Other volatile compounds may be present in the soils below the west dry well, but due to sampling methodologies and laboratory blank contamination this cannot be determined.

Chlorinated benzenes were the most prevalent semi-volatile compound (other than PCBs) detected in soil samples from the west dry well area. Total tri-and tetrachlorobenzene concentrations were reported up to 458.5 mg/kg at 18.5 feet b.g.s. Concentrations of tri- and tetrachlorobenzenes greater than 100 mg/kg were reported at depths of 33.5 feet b.g.s.; and concentrations greater than 1 mg/kg were detected down to 79.0 feet b.g.s. Results of the deepest soil sample collected (118.5 feet b.g.s.) showed tri-and tetrachlorobenzenes at 0.077 mg/kg (Golder 1988). Only one subsurface soil sample (18.5 feet b.g.s.) was analyzed for all Target Compound List semi-volatiles (USEPA method 8270). 1,2,4-trichlorobenzene was detected at 1.4 mg/kg, and traces of hexachlorobenzene were also found. Other tentatively identified compounds found in the samples were tetra-and pentachlorobenzene and di-through octachlorobiphenyls (Golder 1988).

Results of soil samples collected adjacent to the west dry well at the ground surface and at 28 feet b.g.s. showed petroleum hydrocarbon concentrations at 8,600 mg/kg and 1,400 mg/kg, respectively. Petroleum hydrocarbons were detected from 14 to 78 mg/kg in the majority of soil samples collected in this area (Golder 1988).

Analytical results of surface soil samples showed concentrations of cadmium up to 260 mg/kg, chromium up to 470 mg/kg, copper up to 13,400 mg/kg, lead up to 1,110 mg/kg, silver up to 132 mg/kg, and zinc up to 950 mg/kg (Bechtel 1986a). Subsurface soil samples were also analyzed for copper, lead and zinc. Results showed copper concentrations in the soil samples ranged from 2.9 mg/kg at 60 feet b.g.s. to 19.8 mg/kg at 64 feet b.g.s. Lead concentrations in the samples ranged from 4.6 mg/kg (at 60 feet b.g.s. and at 118.5 feet b.g.s.) to 14.5 mg/kg (at 64 feet b.g.s.). Zinc concentrations in the soil samples varied from 21.1 mg/kg (at 118.5 feet b.g.s.) to 28.7 mg/kg (at 64 feet b.g.s.)(Golder 1988).

9.3.3 Vadose Zone Contamination

Table 1 summarizes PCB sample results of soils collected above the water table. These samples were collected from 55 to 65 feet b.g.s. during the installation of monitoring wells (MW)-4, MW-10, and MW-11 situated 200 to 240 feet downgradient (northwest) of the west dry wall (see Figure 4). PCB was detected from 0.11 to 24 mg/kg in the six soil samples collected. Analytical results of soil samples collected from 50 feet b.g.s. to the ground surface did not indicate PCB levels above the laboratory detection limit. In addition to PCB contamination, analytical results of a soil sample collected at 60 feet b.g.s. (monitoring well-11) indicated 1,2,3,4-tetrachlorobenzene at 1.3 mg/kg (Golder 1988).

TABLE 1

RESULTS OF SOIL SAMPLES COLLECTED IN WEST DRY WELL VADOSE ZONE FOR PCB ANALYSES G.E. APPARATUS SHOP

Well	Distance from Drywell	Water Level (feet-b.g.s.)	Sample (feet-b.g.s.)	Total PCBs mg/kg (ppm)
MW-4	200 ft NW(2)	61.7	60.5-61	0.16
MW-10	220 ft W(1)	63.44	55	2.3
	220 ft W(1)	63.44	65	.11
MW-11	240 ft WNW(1)	61.13	60	3.1
	240 ft WNW(2)	61.13	60	24.0
	240 ft WNW(3)	61.13	60	5.4

b.g.s. - Below ground surface
MW - Monitoring Well
(1) - Sample collected from air rotary drill cuttings.
(2) - Sample collected from split spoon drive sampler.
(3) - Split of sample collected from split spoon drive sampler.

9.3.4 Groundwater Contamination

Contaminant releases from the west dry well have impacted the Spokane Valley - Rathdrum Prairie Aquifer. Comparisons of contaminant concentrations found in water samples collected from monitoring wells positioned directly below and downgradient of the west dry well to upgradient analytical results have verified the west dry well as a point source of contamination (see Figure 4 and Table 2) (Golder 1988).

PCBs were detected in groundwater samples collected from screened intervals at 60 to 75 feet b.g.s. in monitoring wells MW-2, MW-4, MW-5, MW-8, and MW-11 (see Figure 4 and Table 2). Analytical results of the groundwater samples indicate the highest PCB concentrations were found at MW-5 at 3.6 ug/l. PCB may also be present in the groundwater samples collected at MW-10 due to the detection of PCB congeners in the samples. PCB congeners were also detected in groundwater samples from MW-9L (screened interval 102 to 117 feet b.g.s.) and MW-9U (screened interval 148 to 158 feet b.g.s.) (Golder 1988; Metro 1987; York 1987).

Tetrachloroethylene and 1,1,1-trichloroethane were detected in most of the wells sampled. The highest concentrations of tetrachloroethylene and 1,1,1-trichloroethane found in the samples were 0.75 ug/l (at MW-2) and 0.33 mg/l (at MW-4), respectively. Results of samples collected from the upgradient well (MW-1) indicate tetrachloroethylene at 0.45 ug/l and 1,1,1-trichloroethane at concentrations below the laboratory detection limit of 0.2 ug/l (Golder 1988).

Benzene was detected in groundwater samples collected from MW-9U, MW-9L, and MW-11. Results indicate that the sample from MW-9U contained the highest benzene concentration at 5.6 ug/l (Golder 1988).

Petroleum hydrocarbons were detected in all the monitoring wells sampled. Petroleum hydrocarbon concentrations in 9 of the 10 downgradient well samples were at least 2 times higher than levels detected in the background well sample (MW-1). Results of the groundwater samples indicated the highest concentration was detected at MW-7 at 17 mg/l (Golder 1988).

Analytical results of groundwater samples collected from on-site monitoring wells show lead and zinc were detected at concentrations above the laboratory detection limits. Results indicate the highest concentration of lead and zinc detected in the groundwater samples was 7 ug/l (MW-1) and 120 ug/l (MW-8), respectively (Golder 1988).

9.3.5 Service Shop Contamination

Analytical results of concrete floor samples, collected from the top 1/4 inch, showed PCB concentrations ranged from 54 to 2,700 mg/kg. Concrete sample results indicate the western portion of the building contained the highest concentration of PCBs (1,160 to 2,700 mg/kg) (Golder 1988).

Soil samples were also collected beneath the concrete floor in the vicinity of the west dry well and the north sump. Results of these

TABLE 2

RESULTS OF GROUNDWATER SAMPLES
G. E. APPARATUS SERVICE SHOP

Well (Screen Depth)	Date Sampled	Tetra Chloro-Ethylene ug/l (ppb)	1,1,1-Tri-Chloroethane ug/l (ppb)	Benzene ug/l (ppb)	PCB ug/l (ppb) Uncentrifuged	PCB ug/l (ppb) Centrifuged	Petroleum Hydrocarbons mg/l (ppm)	Lead (3) mg/l (ppm)	Lead (2) mg/l (ppm)	Zinc (3) mg/l (ppm)	Zinc (2) mg/l (ppm)
MW-1	11-86				0.5 U						
(63-73 ft bgs)	2-87	7.6 U	7.4 U	5.2 U	1.0 U						
	2-87	5 U	5 U	5 U	0.2 U						
	1-88	0.45	0.2 U	0.5 U	0.1 U	0.1 U	0.06	0.007	0.002	0.01 U	0.02
	6-88					0.02 U					
MW-2	11-86				0.5 U						
(61-71 ft bgs)	2-87	7.1 U	5.4 U	4.8 U	<2.0						
	2-87	5 U	5 U	5 U	0.2						
	1-88	0.75	0.28	0.5 U	0.1 U*	0.1 U	0.56	0.002 U	0.002 U	0.08	0.06
	6-88					0.02 U					
MW-3	11-86				0.5 U						
(63-73 ft bgs)	2-87	7.1 U	5.1 U	5.0 U	2.0 U						
	2-87	5 U	5 U	5 U	0.1 U						
	1-88	0.2 U	0.23	0.5 U	0.1 U	0.1 U	0.95	0.002 U	0.002 U	0.001 U	0.01 U
	6-88					0.02 U					
MW-4	11-86				0.5 U						
(60-70 ft bgs)	2-87	6.6 U	5.2 U	5.0 U	<2.0						
	2-87	5 U	5 U	5 U	0.1						
	1-88	0.28	0.33	0.5 U	0.1 U	0.1 U	0.92	0.002 U	0.002 U	0.01	0.01 U
	6-88					0.02 U					
MW-5	11-88				2.6						
(62-72 ft bgs)	2-87	6.1 U	4.6 U	5.2 U	<2.0						
DUP	2-87	6.0 U	4.5 U	5.2 U	3.6						
	2-87	5 U	5 U	5 U	2.4 (1)	0.2 (2)					
	1-88	0.57	0.20	0.5 U	3.6	3.1	0.29	0.002 U	0.002 U	0.06	0.04
DUP	1-88	0.55	0.27	0.5 U	1.4		0.23		0.002 U		0.06
	6-88					0.68					
MW-6	1-88	0.51	0.30	0.5 U	0.54*	0.54*	0.94	0.002 U	0.002 U	0.11	0.01
(102-117 ft bgs)	6-88					0.02 U					
MW-7	1-88	0.72	0.2 U	0.5 U	0.1 U	0.1 U	17	0.002 U	0.003	0.03	0.05
(56-71 ft bgs)	6-88					0.02 U					
MW-8	1-88	0.51	0.30	0.5 U	1.1	0.09	0.29	0.002 U	0.002 U	0.12	0.11
DUP	1-88	0.33	0.31	0.5 U	0.91		0.07	0.002 U		0.10	
(62-77 ft bgs)	6-88					0.13					
DUP	6-88					0.15					

TABLE 2 (cont.)

RESULTS OF GROUNDWATER SAMPLES
G. E. APPARATUS SERVICE SHOP

Well (Screen Depth)	Date Sampled	Tetra Chloro-Ethylene ug/l (ppb)	1,1,1-Tri-Chloroethane ug/l (ppb)	Benzene ug/l (ppb)	PCB ug/l (ppb) Uncentrifuged	PCB ug/l (ppb) Centrifuged	Petroleum Hydrocarbons mg/l (ppm)	Lead (3) mg/l (ppm)	Lead (2) mg/l (ppm)	Zinc (3) mg/l (ppm)	Zinc (2) mg/l (ppm)
MW-9 U (114-119 ft bgs)	1-88 6-88	0.2 U	0.2 U	5.6	0.54*	0.14* 0.02 U	0.13	0.002 U	0.002 U	0.01 U	0.01 U
MW-9 L (148-158 ft bgs)	1-88 6-88	0.2 U	0.2 U	0.74	0.1 U*	0.1 U* 0.02 U	0.30	0.002 U	0.002 U	0.04	0.04
MW-10 (61-76 ft bgs)	1-88 6-88	0.73	0.28	0.5 U	0.1 u*	0.1 U* 0.02 U TR	0.45	0.002 U	0.002 U	0.20	0.08
MW-11 (60-75 ft bgs) DUP	1-88 6-88 6-88	0.52	0.23	0.71	0.71	(<0.05) 0.21 0.23	0.23	0.002 U	0.002U	0.11	0.05

* - Presence of PCB Conginers reported.
(1) - Unfiltered
(2) - Filtered with 0.45 micron membrane filter.
(3) - Filtered with 5.0 micron membrane filter.
TR - Trace

samples showed PCB levels from 622 to 3,851 mg/kg at the west dry well area, and from 12 to 1,271 mg/kg in the north sump area (Golder 1988).

Results of wipe samples, collected from the walls and ceilings, showed PCB concentrations from 2 to 9 ug/100cm^2 (Golder 1988).

9.3.6 North Warehouse Contamination

Analytical results of concrete floor samples, collected from the top 1/4 inch, showed PCB concentrations ranged from 19 to 91 mg/kg. Results of a three-point composite soil sample collected from under the concrete floor showed PCB at 0.2 ug/kg. PCB was also detected in wipe samples, collected from the walls at a concentrations of 0.8 to 14 ug/100cm^2 (Golder 1988).

10.0 ECOLOGY AND ENVIRONMENT, INC., SITE ASSESSMENT

On November 30, 1988, the TAT performed a perimeter inspection of the Service Shop. While performing this site visit, storm drains were noted in the vicinity of the service shop. Photos taken during this site visit are included in the attachment.

11.0 PRELIMINARY EVALUATION OF SOIL TREATMENT TECHNOLOGIES

As previously discussed, analytical results of prior soil and groundwater sampling indicate that subsurface soils in the vicinity of the west dry well are a persisting source for groundwater contamination. Accordingly, expeditious mitigation of this threat to aquifer water quality should be considered. Treatment technologies applicable to remediation and/or stabilization of the contaminated soils include:

- o Slurry walls/Capping (Macroencapsulation)
- o Pozzolanic Fixation
- o In-Situ Vitrification
- o Mobile Incineration
- o Land Disposal

The above list of applicable technologies is not comprehensive, nor are the evaluations complete. Selection of the most appropriate alternative can only be made after a detailed evaluation of all applicable treatment scenarios is completed (i.e., technical feasibility, availability, compliance with applicable or relevant and appropriate requirements of Federal environmental statues and regulations-ARARs, effectiveness, costs, etc.). Technologies which are retained as viable treatment alternatives following a preliminary screening, in terms of the aforementioned considerations, should be tested at the bench or pilot scale to demonstrate site-specific feasibility and to help ensure the success of the subsequent full scale application. In the event that a removal action involving the treatment of the contaminated soils is required, it is recommended that thorough engineering evaluation of all applicable treatment scenarios be performed.

A brief description and preliminary evaluation of each technology follows.

11.1 Slurry Walls/Capping

Slurry walls are low permeability, subsurface fixed walls used to isolate wastes or divert groundwater flow. Typical slurry walls are composed of a soil-bentonite or cement-bentonite mixture. The walls are constructed in a vertical trench that is excavated in the presence of an excavation slurry. The excavation slurry prevents collapse of the trench by hydraulically shoring the sides. The excavation slurry is subsequently displaced by the wall slurry, which "sets up" to form the wall. The existing concrete slabs in the vicinity of the west dry well may (with or without modification) provide an effective barrier to rain and surface water infiltration, and thereby obviate the need for construction of a cap. A slurry wall used in conjunction with a cap would prevent the advection of surface water through the contaminated soil mass, and thereby eliminate a significant mechanism of groundwater contamination.

Complete waste isolation may be achieved by the additional construction of a grout floor beneath the contaminated soils. Grout floors are similar to slurry walls in terms of form and function. The floor is installed by injecting a silicate grout slurry into subsurface soils (at appropriate depth) through injection borings. The slurry subsequently cures to form a low-permeability grout floor. A grout floor, when used in conjunction with a slurry wall and cap, would result in complete isolation (macroencapsulation) of the contaminated soil and thereby further reduce the possibility of contaminant migration.

Some of the advantages associated with this alternative are relatively low cost, ease of availability, and relatively short processing time frame. In addition, implementation of this alternative would not adversely impact subsequent remedial actions, if required. Potential disadvantages include incompatibilities with the Toxics Substances Control Act (TSCA) PCB cleanup and disposal requirements (40 CFR 761), TSCA and Resource Conservation and Recovery Act (RCRA) closure requirements (40 CFR 761 and 265, respectively), and the statutory preferences presented in Section 121 of the Superfund Amendments and Reauthorization Act (SARA). In addition, encapsulation of all soil contaminated with PCBs exceeding TSCA cleanup requirements (i.e., 10 to 25 ppm) may require artificial depression of the water table in the area (Figure 6).

Implementation of this alternative would provide effective short-term mitigation of this threat to aquifer water quality and therefore should be considered in the event that a removal strategy involving a site stabilization objective is adopted. However, due to the incompatibilities with the requirements listed above, and the uncertainty associated with its long-term effectiveness (durability), this "technology" is not considered a viable site remediation alternative.

11.2 Pozzolanic Fixation

Pozzolanic fixation of the contaminated soil would prevent additional contaminant migration by chemically and/or physically immobilizing the contaminants within a solid matrix. Although many different fixation processes are available, all utilize a silicate (pozzolanic) material, such as fly ash or cement kiln dust, mixed with a setting agent, such as lime, cement or gypsum. Typically, proprietary reagents are added to enhance the degree of contaminant immobilization or modify the physical characteristics (e.g., bearing strength) of the fixed waste.

Fixation may be performed on site or in-situ using readily available mobile equipment, and is relatively inexpensive. However, this alternative also displays the disadvantages associated with the slurry wall/capping alternative, specifically, potential incompatibilities with ARARs and the requirement for water table depression. In addition, the resulting waste form may not be amenable to subsequent treatment. Therefore, implementation of this alternative as a site stabilization measure should only be considered after it has been determined that fixation will not adversely impact proposed remedial alternatives.

Implementation of this alternative would result in effective short-term mitigation of the threat to aquifer water quality by reducing contaminant mobility, and is therefore compatible with a site stabilization objective. However, as previously addressed, implementation of this alternative as a site stabilization measure should only be considered after it has been determined that the fixed soil can be effectively treated by the proposed remedial alternatives. Due to potential incompatibilities with the ARARs previously presented, and the uncertainty associated with the long-term durability of fixed wastes (particularly those containing appreciable concentrations of organics), application of this technology is not considered a viable site remediation alternative.

11.3 In-Situ Vitrification

Like pozzolanic fixation, in-situ vitrification of the contaminated soil would prevent contaminant migration by immobilizing the contaminants within a solid matrix. However, the nature of the vitrification process is very different than that of pozzolanic fixation, as are the products. In-situ vitrification is performed by inserting electrodes into the ground adjacent to, and around, the contaminated area. Subsequent application of an electric current across the electrodes results in the generation of heat (due to the high resistance of the soil) which vitrifies the soil. The resulting amorphous, glasslike monolith is extremely resistant to leaching.

It should be noted that due to the thermal nature of the process, and the presence of PCBs and other organic soil contaminants, that application of this technology may result in the generation of organic vapors, including dioxins and furans. Typically, the vapors are collected (by constructing a negative pressure enclosure or "hood" above the process area) and treated (e.g., carbon absorption, condensation) or disposed of.

Advantages associated with this recently developed technology may include, the effectiveness of the contaminant fixation, the durability of the resulting monolith, and its in-situ capability (although some amount of soil excavation would probably be required for this application). Disadvantages may include high cost due to large process energy requirements, potential for generation of dioxins and furans, and potential incompatibility with TSCA PCB treatment requirements.

Implementation of this technology may result in effective long-term mitigation of the threat to aquifer water quality and therefore is considered a viable remedial technology. However, cleanup of the contaminated soil in accordance with TSCA PCB spill cleanup policy would require that the water table be artificially depressed in the immediate area. This requirement would be critical to successful application of this process as the presence of water "short-circuits" the process, rendering it ineffective. However, due to the disadvantages listed above, and the chemical and physical characteristics of the vitrified soil, application of this process in a stabilization context should only be considered after a comprehensive site remediation plan has been developed, and the compatibility of a "vitrification step" with the plan has been clearly demonstrated.

11.4 Mobile Incineration

Incineration of the contaminated soil would result in the thermal destruction (oxidation) of the PCBs and other organic waste consitiuents. Currently there are three types of mobile incinerators available, as distinguished by the type of primary combustion chamber employed: rotary kiln, circulating bed, and infrared.

The availability of a mobile incinerator varies with market demand, but typically ranges from 2 to 12 months. Some advantages associated with a mobile incineration alternative include compliance to the maximum extent possible with ARARs and, as the contaminants are actually destroyed in the process, the elimination of future waste liability concerns. It should be noted that incineration is the best demonstrated and available technology (BDAT) for many chlorinated organics (40 CFR 264), and one of the two TSCA-approved PCB treatment alternatives (40 CFR 761). Disadvantages include relatively high cost, potential logistical and siting problems, long processing time frame, and inability to treat inorganic waste consitiuents.

Implementation of this alternative would result in a permanent reduction in the volume, toxicity and mobility of the organic waste constituents, and is therefore compatible with either removal action objective (i.e., site stabilization or site remediation). In addition, application of this technology will not adversely impact subsequent soil or groundwater treatment, if required.

11.5 Landfill

TSCA-and RCRA-permitted disposal facilities provide secure long-term storage of organic and inorganic wastes as applicable. Some of the advantages associated with landfilling are compatibility with TSCA PCB treatment requirements and immediate availability. Disadvantages include potential incompatibilities with the land disposal restrictions pursuant to RCRA (40 CFR 264), the requirement for off-site transportation, and rigorous incompatibility with the statutory preferences presented in Section 121 of SARA.

Implementation of this alternative would result in mitigation of the threat to aquifer water quality by relocating the source of the contamination. This alternative does not reduce the volume or toxicity of the waste, nor does it affect its inherent mobility, therefore its implementation may not preclude the possibility of future liability. Application of this technology is compatible with a site stabilization objective, as it will not adversely impact subsequent groundwater or soil remediation, if required. Landfilling is also a viable remedial alternative.

REFERENCES

Bechtel National, Inc. August 1986a, **Phase 1 Field Investigation: East 4323 Mission Avenue, Spokane, Washington.**

Bechtel National, Inc., September 1986b, **Field Investigation Report, North Warehouse. Spokane, Washington.**

Bechtel National, Inc, February 1987, **Phase 2 Investigation: East 4323 Mission Avenue, Spokane, Washington.**

Golder Associates, April 1988, **Phase 3 Remedial Investigation: East 4323 Mission Avenue, Spokane, Washington.**

Washington State Department of Ecology (WDOE), March 1986, **Site Inspection Report: General Electric Company, Spokane Apparatus Service Shop, Spokane, Washington.**

Municipality of Metropolitan Seattle (METRO), February 1987, Laboratory Data: Sample Numbers: 77586, 77587, 77588, 77589, 77590, 77591, and 77592.

York, Barry, Environmental Project Manager, March 20, 1987, General Electric Company, Personal Communication to Douglas Dunster, Washington State Department of Ecology.

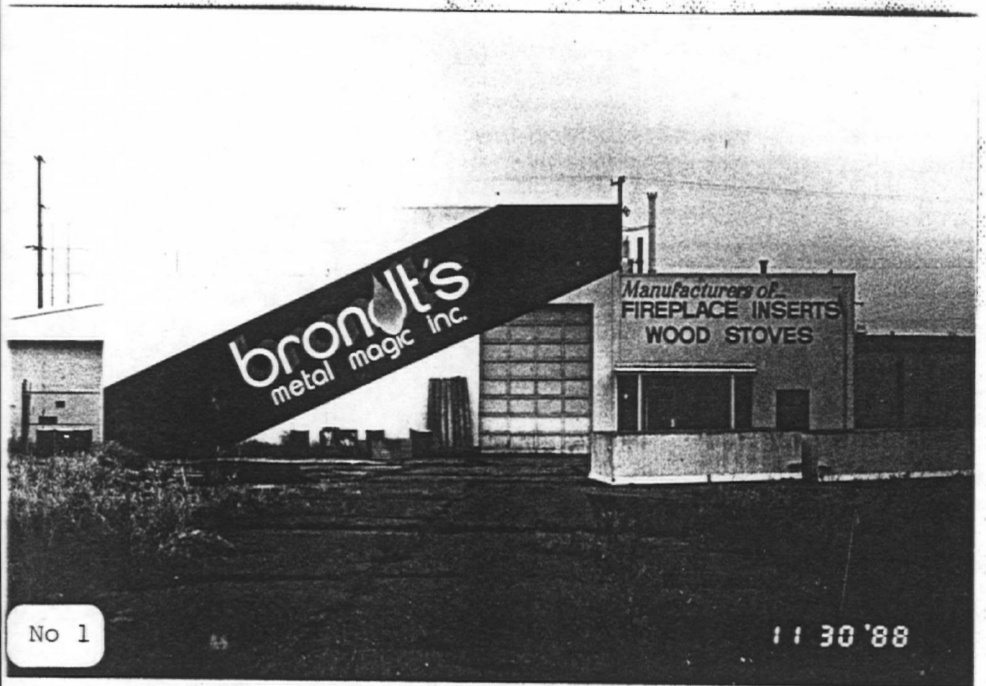
U.S. Environmental Protection Agency (USEPA), 1989, Region X CERCLIS file: G. E. Apparatus Service Shop.

U.S. Geological Survey (USGS), 1973, **Spokane NE Quadrangle, Washington,** Topographic 15-minute series.

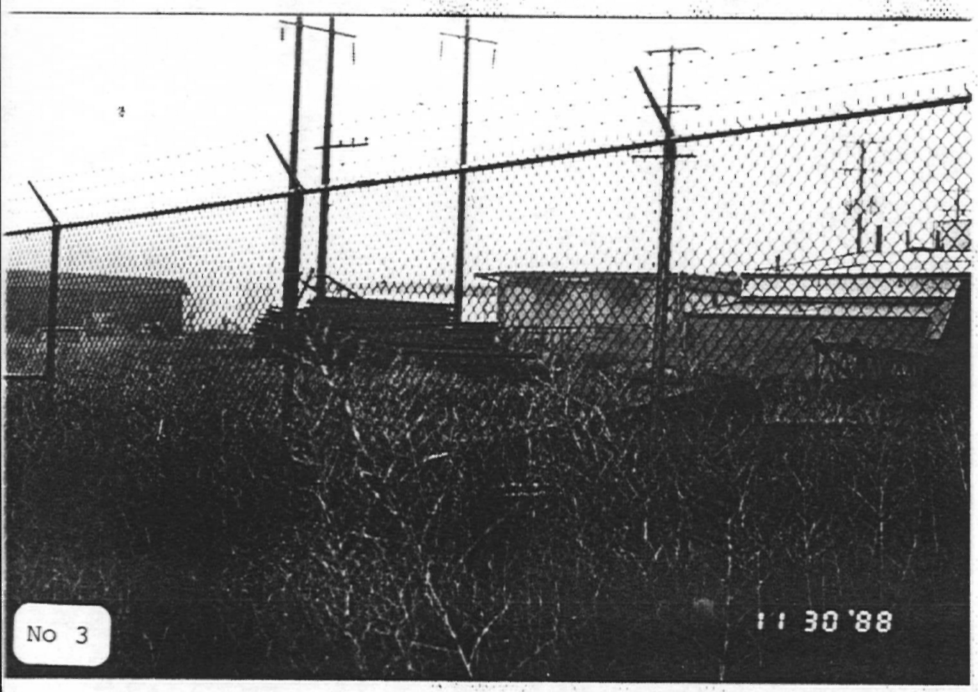
PHOTOGRAPH IDENTIFICATION SHEET

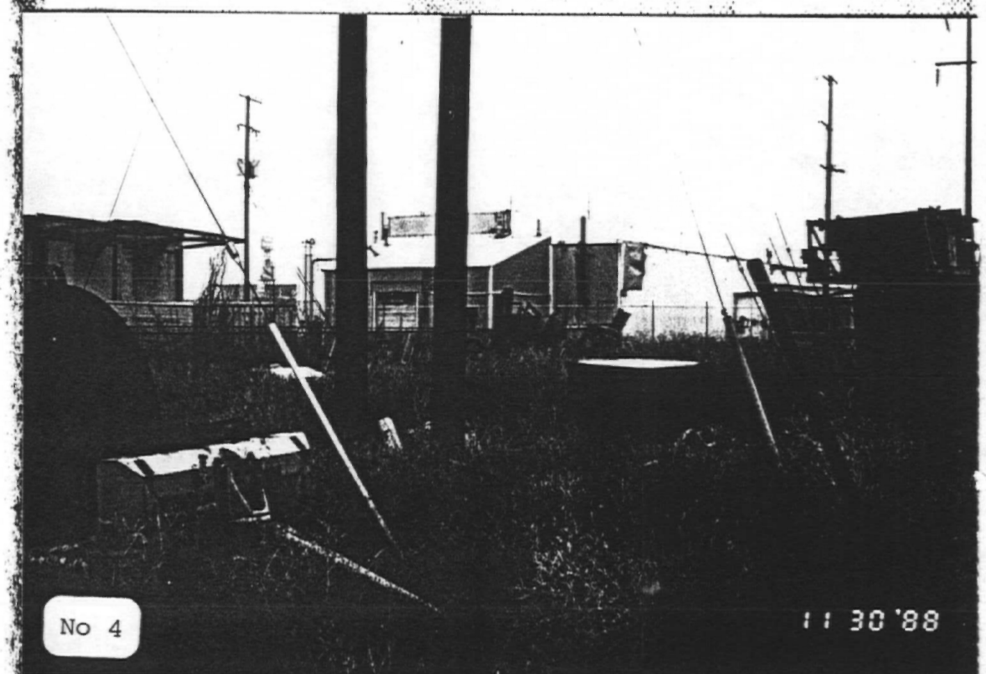
Camera Serial No.: Olympus 2003544 TDD No.: T10-8810-015
Lense Type: 50mm auto focus Site Name: G. E. Apparatus Service Shop

Photo No.	Date	Time	Taken By	Description
1	11-30-88	1135	M. Bray	Service shop front, facing Mission Street.
2	11-30-88	1138	M. Bray	Southwest corner of site.
3	11-30-88	1140	M. Bray	Site from west side of property.
4	11-30-88	1145	M. Bray	Service shop from northwest corner of site.


brondt's
metal magic inc.
Manufacturers of...
FIREPLACE INSERTS
WOOD STOVES
No 1
11 30 '88


No 2
11 30 '88


No 3
11 30 '88


No 4
11 30 '88